

REMARKS

INTRODUCTION:

In accordance with the foregoing, the specification and claims 3, 5 and 6 have been amended. Claims 7-12 are hereby added. No new matter is being presented, and approval and entry are respectfully requested.

Claims 1-12 are pending and under consideration. Reconsideration is respectfully requested.

REJECTION UNDER 35 U.S.C. §112:

At page 2 of the Office Action, claims 5 and 6 were rejected under 35 U.S.C. §112, second paragraph for the reasons set forth therein. Claims 5 and 6 have been amended and are now believed to be in condition for allowance. Accordingly, withdrawal of the §112 rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. §102:

At page 2 of the Office Action, claim 4 was rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,756,956 issued to Sato et al. This rejection is respectfully traversed.

Sato is cited for teaching 1) the voltage drop calculation means, 2) the reference value storage means, 3) the comparison means, and 4) the control means as recited. The Applicants respectfully disagree. Claim 4 recites:

voltage drop calculation means for determining a voltage drop of an average machining voltage with respect to a preset no-load voltage in each predetermined period;

reference value storage means storing a predetermined value representing a voltage drop of a reference average machining voltage with respect to the preset no-load voltage;

comparison means for comparing the voltage drop determined by said voltage drop calculation means and the predetermined value stored in said reference value storage means; and

control means for controlling the relative motion of the wire electrode in each predetermined period by outputting the motion command to said movement means based on a result of the comparison by said comparison means.

Each of these features recites, explicitly or implicitly, a "voltage drop" of an average machining voltage. For example, the voltage drop calculation means determines a voltage drop of an average machining voltage while the reference value storage means stores a value of a voltage drop of a reference average machining voltage.

In contrast, the cited sections of Sato mention a machining apparatus in which a control apparatus outputs a drive command to an axis drive control apparatus. This drive command is outputted in "accordance with the average voltage during machining detected by the average voltage detection circuit 11." *Sato, Column 2, Lines 11-13*. As noted in the current application, the present invention is different from the prior art at least in that a workpiece is moved "based on the ratio (E_s/E_x) between the average voltage drop value E_x and the reference voltage drop value E_s , while in the conventional example, a pulse train is generated based on the voltage difference between the average machining voltage and the reference voltage." *Page 11, Lines 14-17*. Nowhere in Sato is the phrase "voltage drop" even mentioned. Accordingly, Sato cannot be relied upon for teaching the voltage drop calculation means, the reference value storage means, the comparison means, or the control means.

Further, the cited sections of Sato discuss a wire cut electric discharge machine in which the average machining voltage is kept constant as discussed in the background of the present application. Although Sato mentions integrating the number of pulse trains corresponding to the current pulse width in a predetermined period of time to detect the amount of output energy for the electric discharge machining, Sato fails to disclose or suggest controlling relative motion of a wire electrode and a workpiece based on the rate of machining such that a speed of the relative motion is decreased when the rate of machining is increased.

The Applicants respectfully submit that since Sato fails to teach or suggest all of the features of claim 4, claim 4 is allowable over Sato. Thus, withdrawal of the §102(b) rejection is respectfully requested.

REJECTION UNDER 35 U.S.C. §103:

At page 4 of the Office Action, claims 1-3 were rejected under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 4,392,041 issued to Yatomi et al in view of U.S. Patent No. 6,278,075 issued to Kamiguchi et al. The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is respectfully requested.

The Applicants respectfully submit that the rejection fails to establish a prima facie case

of obviousness. To establish a prima facie case of obviousness, three basic criteria must be met. *MPEP 2142*. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. *Id.* Second, there must be a reasonable expectation of success. *Id.* Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *Id.* The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *Id.*

Regarding claim 1, the Examiner admits Yatomi fails to teach the motion control means as recited. The Examiner instead cites Kamiguchi for teaching this feature. The Applicants respectfully disagree. Claim 1 recites:

motion control means for controlling relative motion of the wire electrode and the workpiece based on the rate of machining determined by said machining rate determining means such that a speed of the relative motion is decreased when the rate of machining is increased.

Kamiguchi does not teach decreasing a relative motion of a wire electrode and a workpiece when a rate of machining is increased. Rather, Kamiguchi discloses obtaining a change rate of thickness of a workpiece based on a ratio of an inputted energy when the workpiece is machined by a predetermined distance to a reference inputted energy when a reference workpiece is machined by the predetermined distance. The thickness of the workpiece is calculated based on the obtained change rate of the thickness and a thickness of the reference workpiece. The controller copes with the change of thickness of the workpiece in performing a first cutting of the electric discharge machining but was never intended to cope with a change of width (Gx, Gs) of a portion to be removed in performing a second (and subsequent) cutting of the electric discharge machining.

In the present invention, the number of times of electric discharge in each predetermined time period is monitored to determine the rate of machining whereas the number of pulses for discharge machining in each progress of machining by a predetermined distance is monitored in Kamiguchi to determine the change of thickness of the workpiece. If the number of times of electric discharge in a predetermined time period are counted, the change of thickness of the workpiece cannot be detected.

Moreover, the motion control means of the present invention controls the relative motion of the wire electrode and the workpiece in accordance with the determined rate of machining whereas the controller of Kamiguchi controls a pause time period of voltage applied between the

wire electrode and the workpiece so that the machining current density is kept constant.

For at least these reasons, the Applicants respectfully submit that the combination of Yatomi and Kamiguchi fails to teach or suggest the motion control means as recited, and therefore fails to establish a prima facie case of obviousness. Further, the Applicants respectfully submit that the Examiner has failed to show a teaching or suggestion, in the prior art, to combine the references. Accordingly, claim 1 is deemed to be allowable over the art of record. Therefore, withdrawal of the §103(a) rejection is respectfully requested.

Regarding the rejection of claims 2 and 3, these claims are dependent on independent claim 1, and are therefore believed to be allowable for at least the reasons noted above.

At page 6 of the Office Action, claims 5 and 6 were rejected under 35 U.S.C. §103(a) as being obvious over Sato in view of Kamiguchi. The reasons for the rejection are set forth in the Office Action and therefore not repeated. The rejection is traversed and reconsideration is respectfully requested.

Regarding claim 5, the Examiner cites Sato for teaching the voltage drop determination means, reference value storage means, and means for obtaining a ratio as recited. The Applicants respectfully disagree. Claim 5, as amended, recites:

voltage drop determination means for determining a voltage drop of an average machining voltage with respect to a preset no-load voltage in each predetermined period;

reference value storage means storing a predetermined value representing a voltage drop of a reference average machining voltage with respect to the preset no-load voltage;

means for obtaining a ratio between the voltage drop determined by said voltage drop determination means and the predetermined value stored in said reference value storage means.

Each of these features recites, explicitly or implicitly, a "voltage drop" of an average machining voltage. As discussed above, Sato does not mention a "voltage drop." Accordingly, Sato cannot be relied upon for teaching these features. The Applicants respectfully submit that Kamiguchi fails to make up for this deficiency. While Kamiguchi does mention a voltage drop, that drop is used to determine that electricity can be discharged between a workpiece and an electrode. Kamiguchi does not teach obtaining a voltage drop of an average machining voltage, comparing that value to a reference value, and obtaining a ratio between the two.

For at least these reasons, the Applicants respectfully submit that the combination of Sato and Kamiguchi fails to teach or suggest all of the recited features, and therefore fails to establish a prima facie case of obviousness. Further, the Applicants respectfully submit that the

Examiner has failed to show a teaching or suggestion, in the prior art, to combine the references. Accordingly, claim 5 is deemed to be allowable over the art of record. Therefore, withdrawal of the §103(a) rejection is respectfully requested.

Regarding the rejection of claim 6, this claim is dependent on independent claim 5, and is therefore believed to be allowable for at least the reasons noted above.

NEW CLAIMS 7-12:

New claim 7 is directed to a controller that comprises

a motion control part to control relative motion of the wire electrode and the workpiece based on the rate of machining determined by said machining rate determining part such that a speed of the relative motion is decreased when the rate of machining is increased.

Therefore, it is submitted that claim 7 patentably distinguishes over the prior art.

New claims 8 and 9 depend from independent claim 7 and include all of the feature of claim 7 plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that these claims also patentably distinguish over the prior art.

New claim 10 is directed to a controller that comprises

a voltage drop calculator to determine a voltage drop of an average machining voltage with respect to a preset no-load voltage in each predetermined period;

reference value storage storing a predetermined value representing a voltage drop of a reference average machining voltage with respect to the preset no-load voltage;

a comparison part to compare the voltage drop determined by said voltage drop calculator and the predetermined value stored in said reference value storage; and

a controller to control the relative motion of the wire electrode in each predetermined period by outputting the motion command to said movement part based on a result of the comparison by said comparison part.

Therefore, it is submitted that claim 10 patentably distinguishes over the prior art.

New claim 11 is directed to a controller that comprises

a voltage drop determination part to determine a voltage drop of an average machining voltage with respect to a preset no-load voltage in each predetermined period;

a reference value storage storing a predetermined value representing a voltage drop of a reference average machining voltage with respect to the preset no-load voltage; and

a ratio calculator to obtain a ratio between the voltage drop determined by said voltage drop determination part and the predetermined value stored in said reference value storage.

Therefore, it is submitted that claim 11 patentably distinguishes over the prior art.

New claim 12 depends from independent claim 11 and includes all of the feature of claim 11 plus additional features which are not taught or suggested by the prior art. Therefore, it is submitted that this claim also patentably distinguishes over the prior art.

CONCLUSION:

In accordance with the foregoing, it is respectfully submitted that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the prior art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.


If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited by the Examiner contacting the undersigned attorney for a telephone interview to discuss resolution of such issues.

If there are any underpayments or overpayments of fees associated with the filing of this Amendment, please charge and/or credit the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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